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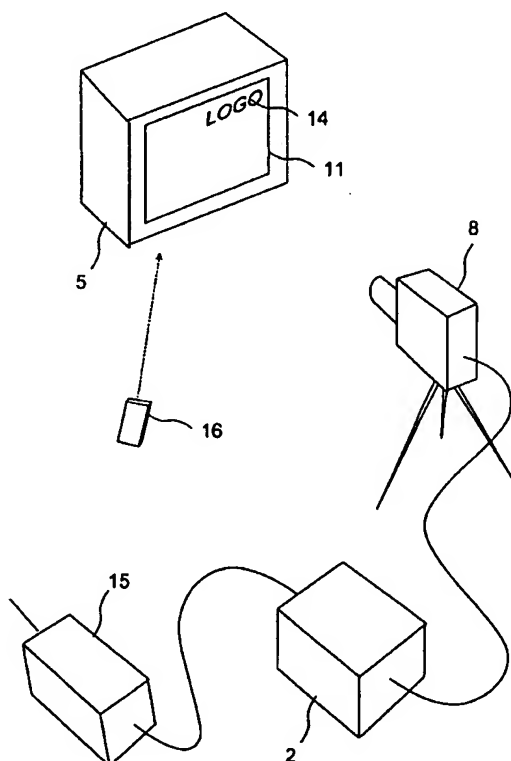
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(54) Title: A METHOD AND A SYSTEM FOR IDENTIFYING A CHANNEL FOR AUDIENCE RESEARCH, AND A CHANNEL MEASURING DEVICE



(57) Abstract: The invention relates to a method for identifying a channel for viewer research. To identify the channel, the video signal of the channel or the video signal formed on the basis of information broadcast on the channel, is examined, which video signal is intended to be displayed on a monitor (11). The invention also relates to a system (1) for viewer research, and a channel measuring device (2), in which the method is applied.

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A method and a system for identifying a channel for audience research,
and a channel measuring device

5 The present invention relates to a method for identifying a channel for
viewer research from a video signal which is supplemented with chan-
nel identification data. The invention also relates to a system for viewer
research, comprising means for identifying a channel from a video sig-
10 nal supplemented with channel identification data. Furthermore, the
invention relates to channel measuring device comprising means for
identifying a channel from a video signal supplemented with channel
identification data.

15 Ratings of viewers of television channels are measured *e.g.* to evaluate
how interesting the programs broadcast on different television channels
are considered. This information interests both the producers of the
television channels and the advertisers. For the producers of television
channels, the viewer ratings tell what kind of programs are popular to
20 watch. Thus, in the acquisition of new programs and in the planning of
continuation to existing programs, one is more likely to end up in an
arrangement in which the viewer ratings of programs to be broadcast
remain as high as possible. On the other hand, different television
channels compete with each other for the viewers, wherein many pro-
25 ducers try to acquire programs which interest as many viewers as pos-
sible. Also advertisers want to invest on advertisements to be broad-
cast in connection with such television programs which have many
viewers who belong to the target group of the advertiser. Thus, in addi-
tion to the viewer ratings, the measurements are also aimed at finding
30 various statistical data on the viewers, such as their age and/or sex
distribution. In addition, particularly in connection with various regional
programs, the aim may be to find out regional statistical data.

35 The arrangements of prior art are primarily based on the activity of
selected viewers. In this case, a group of viewers are given a measur-
ing device, wherein these viewers enter, in the measuring device, data
about the television channel they are watching as well as data about

how many viewers are watching the program broadcast on this television channel. Furthermore, in some cases, it is possible to enter more detailed data about the viewers, such as said age and/or sex, in the measuring device. The measuring device transmits the data to a measuring centre for collecting measurement data, normally by using a telephone connection. Thus, the measuring centre compiles the data from the different devices and uses statistical mathematical methods to make a national and/or a regional analysis of the viewer ratings of the television channels to be measured. The number and location of the measuring devices are to be selected so that the data obtained from the measuring devices would represent the viewer habits of a given geographical region as well as possible.

International application publication WO 00/70869 presents a method and a device for identifying a channel in viewer research by examining the video signal of the channel. A digital signature is formed of the video signal, to be compared with a reference signature (*e.g.* a signature formed of a reference signal) to find out which channel is selected in a television set. The reference signal can be generated by a separate tuner in which the selection of the channel is controlled on the basis of whether the signatures to be compared match or not. The signature and the reference signal are formed of the video signal. The system according to said publication has, for example, the problem that the content of the video signal normally varies to a great extent, wherein it may be difficult to find a suitable reference signal. Furthermore, reference signals, or digital signatures formed of them are stored in the system, which requires a lot of storage capacity.

Arrangements are also known in which, at the broadcasting stage, the video signal is supplemented with information to be detected by a device for measuring viewer ratings connected to the viewer's set and using this information to identify the television channel being watched. This supplemental information is included in such a part of the channel signal which is not displayed on the monitor of the receiver. A problem in such an arrangement is, for example, that the signal to be broadcast must be supplemented with information which is only used for

measuring the viewer ratings. This requires that auxiliary equipment is used at the broadcasting stage before the method can be applied. Yet another problem is that the device for measuring viewer ratings must be connected to such a part of the receiver where this auxiliary information is included. This requires that the receiver has such an output connection from which the video signal can be lead to the device for measuring viewer ratings.

It is an aim of the present invention to teach an improved method, a system and a device for identifying a channel for the measurement of viewer ratings. The invention is based on the idea that the measuring device is used to examine a video signal intended to be displayed on a monitor, by analysing the video signal of the channel or a video signal formed on the basis of information broadcast on the channel, to find out which channel is in question. The analysis of the video signal can be made, for example, from a video signal output connection possibly provided in the receiver, or with a separate camera. When a camera is applied, it is trained on the video signal displayed on the monitor. To put it more precisely, the method according to the present invention is primarily characterized in examining the video signal of the channel or the video signal formed on the basis of information broadcast on the channel, intended to be displayed on a monitor, to detect the identification data of the channel, wherein the detected channel identification data is used for identifying the channel. The system according to the present invention is primarily characterized in that the means for identifying the channel comprise means for examining the video signal of the channel and/or a video signal formed on the basis of information broadcast on the channel, to detect the channel identification data, which video signal is intended to be displayed on a monitor, wherein the detected channel identification data is intended to be used for identifying the channel. The channel measuring device according to the present invention is primarily characterized in that the means for identifying the channel comprise means for examining the video signal of the channel and/or a video signal formed on the basis of information broadcast on the channel, to detect the channel identification data, which video signal is intended to be displayed on a monitor, wherein

the detected channel identification data is intended to be used for identifying the channel.

5 The present invention shows remarkable advantages over solutions of prior art. To analyse the video signal, there is no need to modify the receiver or the monitor. Because the measurement utilizes information which is independent of the measuring system and which is included in the video information in any case, the measuring arrangement according to the invention will not require any changes at the broadcasting
10 end either. Furthermore, the arrangement of the invention is independent of the transmission path and the transmission technology. The analysis of the video signal is also independent of the technology of the monitor, wherein the monitor may be any device suitable for displaying a video signal, such as a picture tube, a liquid crystal display (LCD), a plasma display, a display device applying projection technology, *etc.*
15 Furthermore, in the system according to an advantageous embodiment of the invention, the receiver does not require a video signal output connection, but the analysis can be made from the image displayed on the monitor of the receiver, for example by means of a camera.

20 In the following, the invention will be described in more detail with reference to the appended drawings, in which

25 Fig. 1 shows the system according to a preferred embodiment of the invention in a reduced block chart,

Fig. 2 shows a device according to a preferred embodiment of the invention in a reduced block chart,

30 Fig. 3 shows an example situation in which the system according to an advantageous embodiment of the invention can be applied, and

35 Fig. 4a shows an example of the frame structure used in the data stream of a digital television broadcasting,

Fig. 4b is a chart showing an example of the couplings between identifiers to be transmitted in the data stream of a digital television broadcasting, and tables.

- 5 Figure 1 shows functional blocks in a system 1 according to an advantageous embodiment of the invention in a reduced manner. The system 1 comprises viewer rating measuring devices 15 which are used at several different receiving points, such as households. Information transmitted from the viewer rating measuring devices is collected in a
10 computing centre 3 or the like. On the basis of the information from the different viewer rating measuring devices 15, the computing centres 3 compute the viewer ratings preferably by applying statistical mathematics.
- 15 Figure 2 shows, in a reduced manner, the structure of a channel measuring device 2 according to an advantageous embodiment of the invention. The channel measuring device 2 comprises video signal analyzing means 4 for performing, *e.g.*, the analysis of the video signal received with a receiver 5. The analyzing means 4 may comprise, for
20 example, connecting means 6 which are connected to an output 7 possibly provided in the receiver 5 so that the video signal received by the receiver 5 at each time can be led to another device, for example a video recorder (not shown), for storage. Another possibility is that the analyzing means 4 are equipped with a camera 8 in which the video
25 signal displayed on the monitor 11 is converted to a suitable format. Furthermore, the channel measuring device 2 comprises detecting means 9 for detecting identification data, to identify the channel identification data 14 from the received video signal.
- 30 The channel measuring device 2 according to the invention is suitable for use, for example, in connection with a viewer rating measuring device 15, *e.g.* to inform the viewer rating measuring device of the channel being watched each time. Such a viewer rating measuring device 15 typically comprises input means 12 which can be used to
35 enter the number of viewers and possibly also other information. Furthermore, the viewer rating measuring device 2 may comprise data

transmission means 13 for transmitting measurement data to a computing centre 3 or the like.

5 In a digital television system, the data stream of a single channel (Digital Video Broadcast, DVB) can be used to broadcast information of more than one program sources. Figure 4a shows the data frame used by a digital television system for the broadcasting of digital information. The frame or packet 400 comprises a header 401 and a payload 402. Typically, the data stream of digital broadcasting consists of such
10 packets 400 of standard length. Depending on the quantity of information to be broadcast, the transmission frequency of the packets can be dynamically varied.

15 The Program Identification (PID) 403 in the header of the data stream determines the packet type. Normally, video and audio information of several different programs as well as other information is communicated in the data stream, distinguished by different PIDs. For a given PID (for example, PID = 0), a so-called Program Association Table (PAT) 404 is found, including a list of television programs which the
20 data stream contains. Each television program consists of at least a video track and a sound track which are transmitted as different data streams by means of their separate PIDs. The partial components belonging to a single television program are given in a Program Map Table (PMT) 405, and it is exactly the PMTs of the different programs
25 which the PAT refers to. Reference to the PMTs is made in the same way, by means of their PIDs.

30 A PMT may also contain a reference to an Application Information Table (AIT, not shown in the appended figures), which further represents the PIDs of the software applications relating to the television program to be broadcast. By means of them, the software can be picked up from the data stream and attached to the television program to be watched. After the software defined by the AIT has been received, it can be run locally in a digital receiver.

Figure 4b is a chart showing an example of the references between the tables of digital video broadcasting. The tables, as well all the other information to be transmitted in the data stream of the digital television broadcast, is composed directly from the data stream by means of the
5 PID referring to the same.

The following is a description of the operation of the method according to a preferred embodiment of the invention in the example situation of Fig. 3. The viewer selects, for example by using a channel selector 16,
10 such as a remote control, the television channel, a teletext channel, or the like, to be received in the receiver 5. At the broadcasting stage, such a video signal can be provided with information which indicates the channel in question. In some cases, also the device receiving and/or processing the signal of the channel may, on the basis of the
15 channel signal, supplement the video signal with information which can be used for identifying the channel. In this description, this information will be called channel identification data. This identification data is, for example, numerical data of the television channel in question, such as 1, 2, 3, or 4, or it may also be text-format data, such as YLE1, MTV3,
20 or the graphical identification (logo) of the television channel, or an electronic program guide or a similar service. In digital television systems, one channel may comprise several video and audio signals. In digital television broadcasting, it is possible to use program identifications PID to identify the channel being watched. Thus, preferably when selecting or changing the channel, the TV set or the
25 decoder for digital television broadcasting, *i.e.* a so-called set-top box (STB), provides the video signal intended to be displayed on the monitor with information about the selected channel, such as the name of the program, an identification, *etc.* In this case, the channel measuring device may look for this information in the video signal. The
30 search can also be made *e.g.* by examining at which point of the video signal a change takes place. On the other hand, the channel identification data remains substantially the same for at least some time, wherein it is also possible to examine, which point of the image contains such information which remains the same. On the basis of the
35 examination, it can be determined if the data remaining constant is

channel identification data or not. Furthermore, if a point is known where the channel identification data is added, the search can be limited to this point of the video signal.

- 5 In this context, it should be mentioned that the term channel is not as unambiguous in digital television broadcasting as in conventional analog television broadcasting, which is due, for example, to the fact that the data stream to be transmitted on one channel normally includes the signals of more than one program sources. Therefore, in this description, the term channel identification data refers to information relating to one program. The program, as such, may be a television program to be watched, an application program (software) or service program (software) intended to be performed in a digital television receiver, *etc.*
- 10
- 15 If the channel measuring device is connected to the receiver 5 by connection means 6, the signal analysis is made on the basis of this signal. Thus, for example, a certain signal form which is known to relate to a channel identifier is looked for in the signal coming through the connection means 6. With the analyzing means 4, this signal format can be
- 20 searched for either at a given point or at any point. In some countries, the channel identification data 14 is normally placed to be displayed at a specific point on the monitor, for example in the vicinity of the right upper hand corner of the monitor 11. In this case, the timings of the video signal to be led to the channel measuring device 2 can be used
- 25 to find out the point where the identification data 14 is probably located, wherein the analysis can be restricted to such a location. On the other hand, the invention is not limited solely to such situations but the search can also be made elsewhere in the video signal.
- 30 In the memory 10 of the channel measuring device 2, it is possible to store reference data relating to several different identifiers which are utilized in the search for the identification data 14. Thus, in the detecting means 9, the received video signal is compared with some stored reference data or, for example, with reference data learned on the
- 35 basis of an interpretation of a video signal received previously by another device 2, or in another suitable way. If the comparison shows

that the identification data 14 and the reference data substantially match, it is determined that the video signal to be received is the signal of the channel corresponding to said identification. On the other hand, if the comparison does not provide certainty of the channel, a comparison is made with other stored reference data. The comparison step is iterated until the correct identification is found or until all the stored reference data has been scanned through.

If no item of the stored reference data has matched the identification data 14 in the video signal, or if there is no reference data available, it is possible, in the method according to an advantageous embodiment of the invention, to take the following steps. The video signal is analyzed to find such a point in the video signal where the information remains as unaltered as possible for a long time. It is thus assumed that said point is one containing information about the channel. After this, said point of the video signal is analyzed to perform pattern recognition, text recognition, or the like, to find out if the location contains such information which can be identified, for example a number or a text. In this case, the broadcasting party is identified on the basis of this information.

In the example situation shown in Fig. 3, a camera 8 is used by which the video signal is entered in the channel measuring device 2. The camera 8 is trained on at least that point on the monitor 11 of the receiver 5 where the identification data 14 is probably located. Preferably, the camera 8 is used to record at least the area of the whole monitor 11. The signal generated in the camera 8 is led to analyzing means 4 in which the identification data 14 is searched and identified on the basis of the camera signal. Also in this alternative, it is possible to apply the above-described principles to a large extent.

In a situation in which the viewer is reading teletext pages, it is possible to apply the above principles. Also in this case, the viewer has selected a television channel on which teletext information is broadcast in addition to the program. This teletext information is transmitted in such a part of the image which is not converted directly to a visible video

signal but the watching requires teletext facilities of the receiver or the use of an auxiliary device. In this case, the teletext information is converted to a video signal to be displayed on the monitor 11 of the receiver. Also in this case, according to the method according to the invention, the television channel is determined on the basis of the video signal intended to be displayed on the monitor.

The analysis of the video signal and its comparison with various reference data can be performed for a relatively long period of time, because the identification data remains substantially unchanged for a relatively long time, even several minutes. Thus, the analysis and comparison can be performed for the time of several images.

The video signal of the channel can also be led to the channel measuring device 2 via an adapter (not shown) suitable for the purpose, such as RF emission in connection with a picture tube.

It will be obvious that the present invention is not limited solely to the above-presented embodiments but it can be modified within the scope of the appended claims.

Claims:

1. A method for identifying a channel, for viewer research, from a video signal supplemented with channel identification data (14), **character-**
5 **ized** in examining the video signal of the channel or a video signal formed on the basis of information broadcast on the channel, to detect the channel identification data (14), the video signal being intended to be displayed on a monitor (11), wherein the detected channel identification data (14) is used for identifying the channel.
- 10 2. The method according to claim 1, **characterized** in that for making the analysis, the received video signal is compared with one or more items of stored reference data corresponding to the channel identification data (14).
- 15 3. The method according to claim 1 or 2, **characterized** in that the analysis is made of such an element of the video signal which is intended to be displayed on a certain part of the monitor (11).
- 20 4. The method according to claim 1, 2 or 3, **characterized** in that in the method, at least one of the following identification methods is applied:
- pattern recognition,
 - text recognition.
- 25 5. The method according to any of the claims 1 to 4, **characterized** in that in the method, information formed on the basis of the analysis is stored, wherein previously stored information is utilized in the channel identification.
- 30 6. The method according to any of the claims 1 to 5, **characterized** in that the video signal of the channel is received in a receiver (5), and that the video signal obtained from the receiver (5) is used in the analysis.
- 35

7. The method according to any of the claims 1 to 6, **characterized** in that the video signal is video information broadcast in a digital data stream, wherein the channel identification data is transmitted in the video information and it is added in the video signal to be displayed on the monitor, and that the channel is identified from this video signal which has been supplemented with the channel identification data.

8. The method according to any of the claims 1 to 7, **characterized** in that in the method, a camera (8) is used for recording the signal displayed on the monitor (11) of the receiver, wherein the video signal formed by the camera (8) is used in the analysis.

9. The method according to any of the claims 1 to 8, **characterized** in that in the method a channel is selected to be received, of which a video signal is received that is intended to be displayed on the monitor (11), and which video signal is equipped with channel identification data (14).

10. A system (1) for viewer research, comprising means (4, 9) for identifying a channel from a video signal which is supplemented with channel identification data (14), **characterized** in that the means for identifying the channel comprise means for examining the video signal of the channel and/or the video signal formed on the basis of the information broadcast on the channel, to detect the channel identification data (14), which video signal is intended to be displayed on a monitor (11), wherein the detected channel identification data (14) is arranged to be used in the identification of the channel.

11. The system according to claim 10, **characterized** in that it comprises a receiver (5) for receiving a video signal, and that the analysis is arranged to be performed on the basis of a video signal obtained from the receiver (5).

12. The system according to claim 10 or 11, **characterized** in that the video signal is video information transmitted in a digital data stream, which is supplemented with channel identification data, and which

system comprises means for adding the channel identification data in the video signal to be displayed on the monitor, and that the channel is arranged to be identified from the video signal which is supplemented with the channel identification data.

5

13. The system according to claim 10, **characterized** in that the system comprises a camera (8) for recording a signal displayed on the monitor (11), wherein the analysis is arranged to be made on the basis of the video signal formed by the camera (8).

10

14. The system according to any of the claims 10 to 13, **characterized** in that it comprises viewer rating measuring devices (15) for transmitting information relating to viewer ratings, and at least one computing centre (3) for receiving and analyzing information transmitted from viewer rating measuring devices (15) and relating to viewer ratings.

15

15. The system according to claim 14, **characterized** in that it comprises receivers (15) for receiving a video signal, which video signal is supplemented with channel identification data (14), means (16) for selecting a channel to be received by a receiver (5), that the viewer rating measuring devices (15) comprise a channel measuring device (2) for identifying the channel selected with the receiver (5), on the basis of the video signal displayed on the monitor (11), and means (12) for informing the computing centre (3) of the viewer information.

20

25

16. A channel measuring device (2) comprising means (4) for identifying a channel from a video signal which is supplemented with channel identifying data (14), **characterized** in that the means for identifying the channel comprise means for examining the video signal of the channel and/or the video signal formed on the basis of the information broadcast on the channel, to detect the channel identification data (14), which video signal is intended to be displayed on a monitor (11), wherein the detected channel identification data (14) is arranged to be used in the identification of the channel.

30

35

17. The channel measuring device (2) according to claim 16, **characterized** in that the video signal is provided with channel identification data (14), and that the channel measuring device (2) comprises comparing means for comparing the received video signal with one or more
5 items of stored reference data corresponding to the channel identification data (14).

18. The channel measuring device (2) according to claim 16 or 17, **characterized** in that it comprises means (6) for connecting to the
10 receiver (5), wherein the analysis is arranged to be made on the basis of the video signal obtained from the receiver (5).

19. The channel measuring device (2) according to claim 16 or 17, **characterized** in that it comprises a camera (8) for recording a signal
15 displayed on the monitor (11), wherein the analysis is arranged to be made on the basis of the video signal formed by the camera (8).

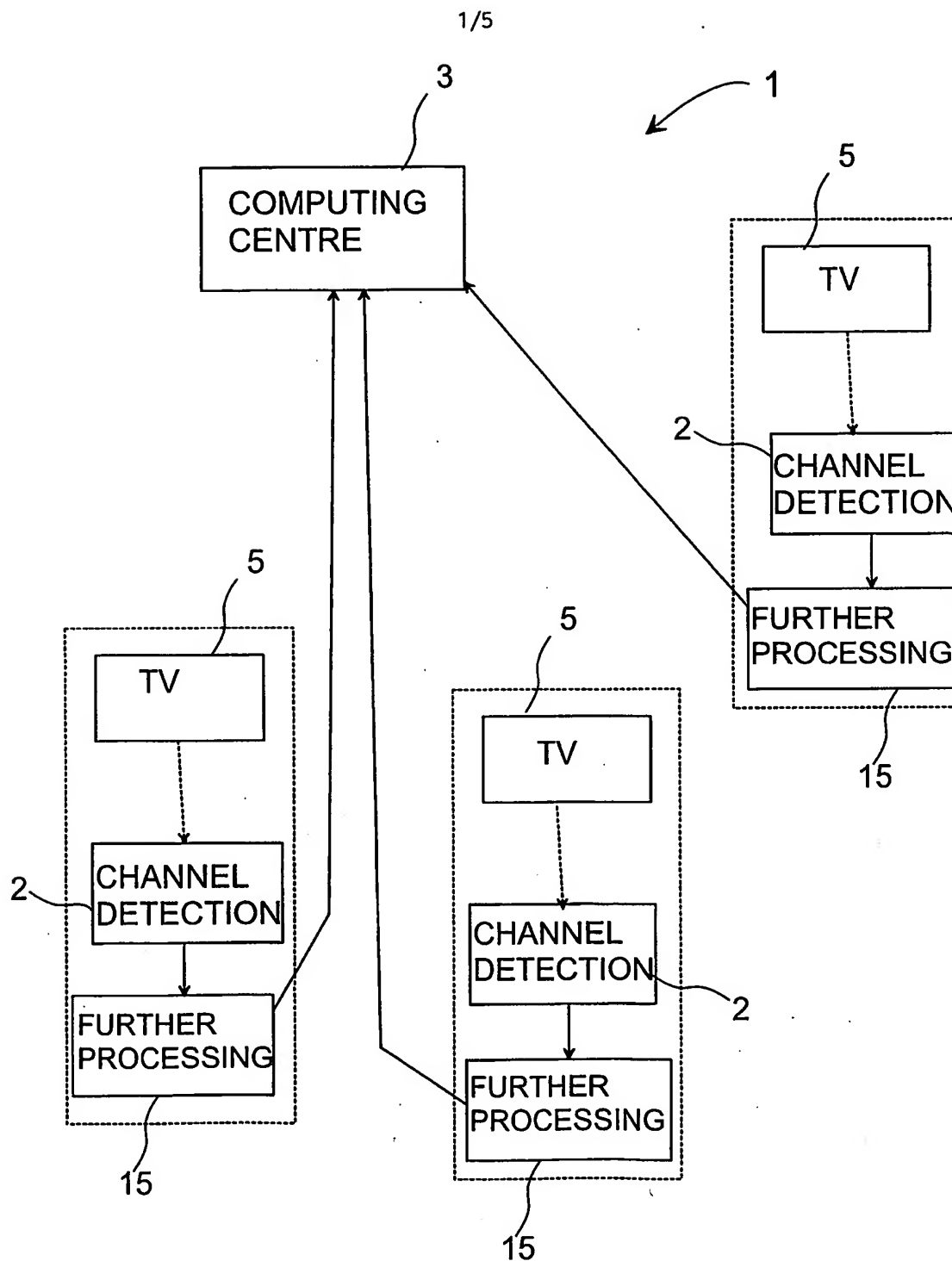


Fig. 1

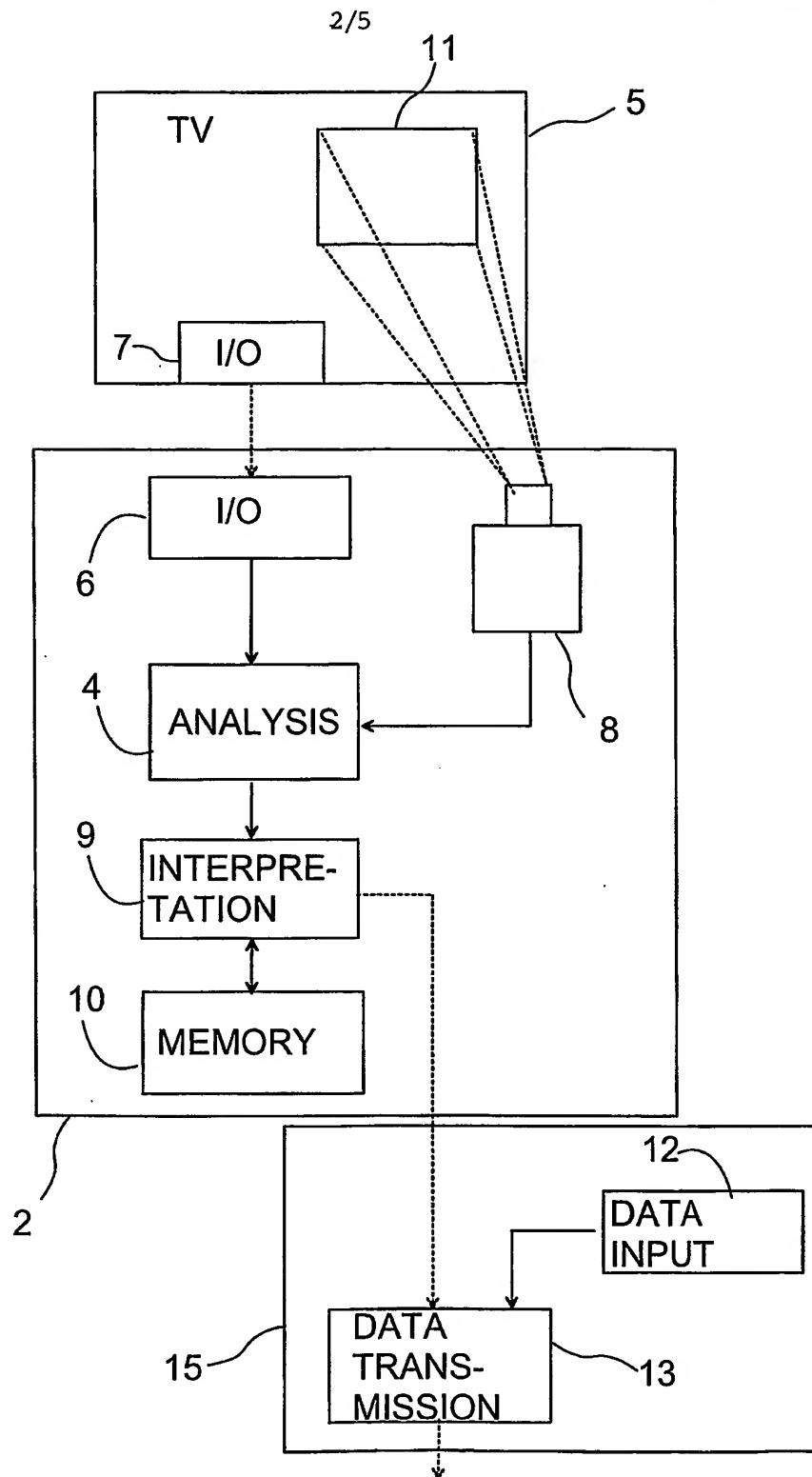


Fig. 2

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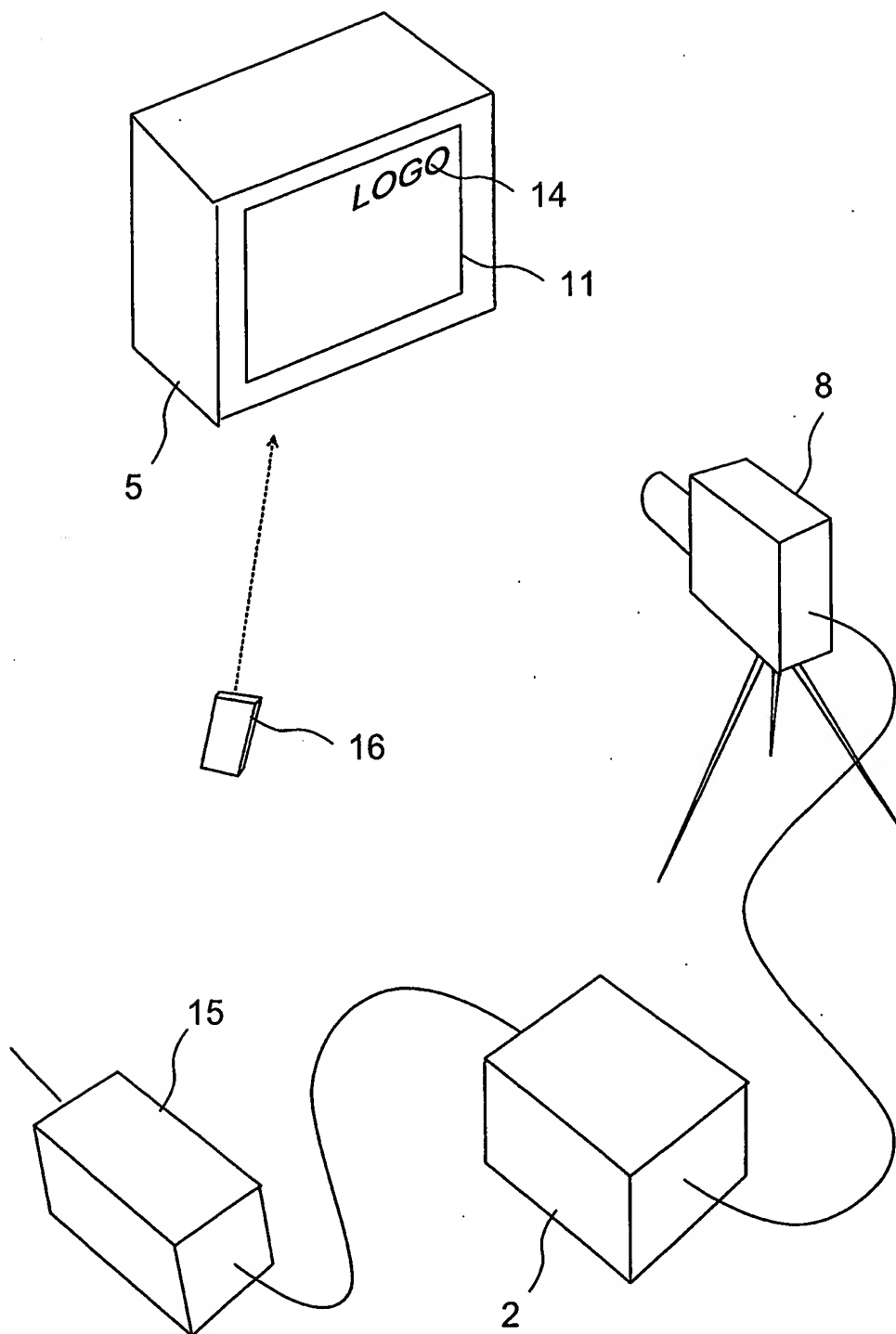
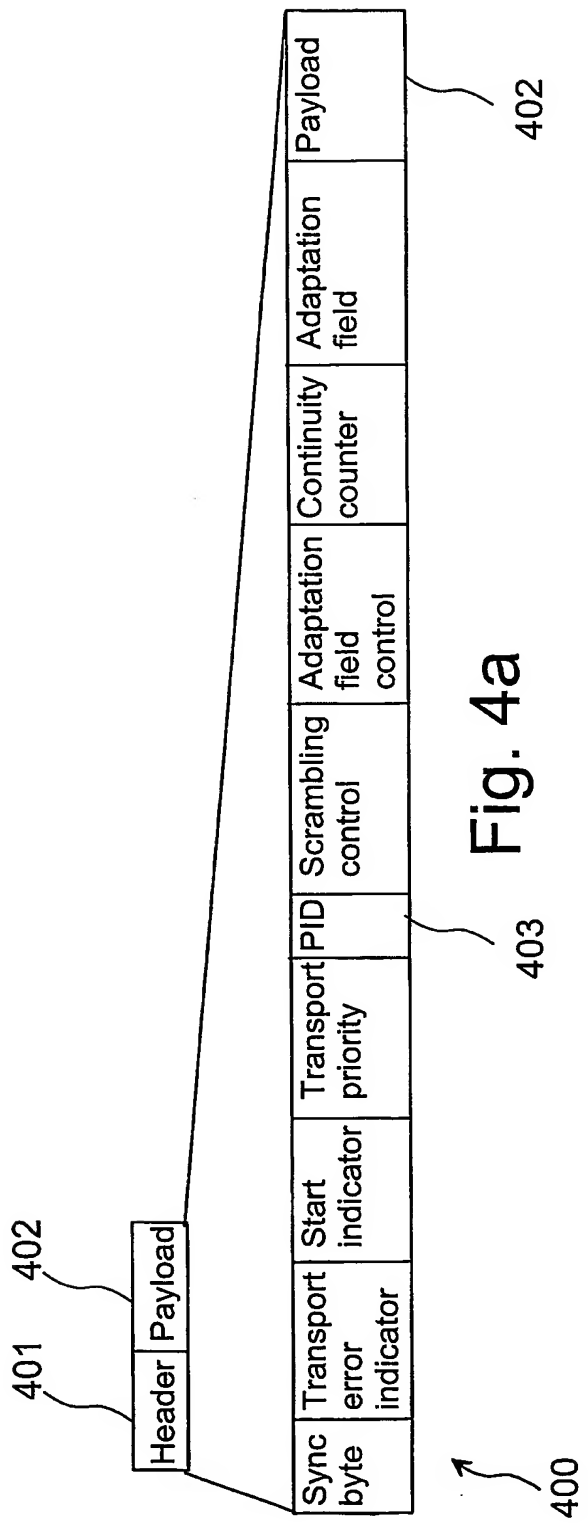


Fig. 3



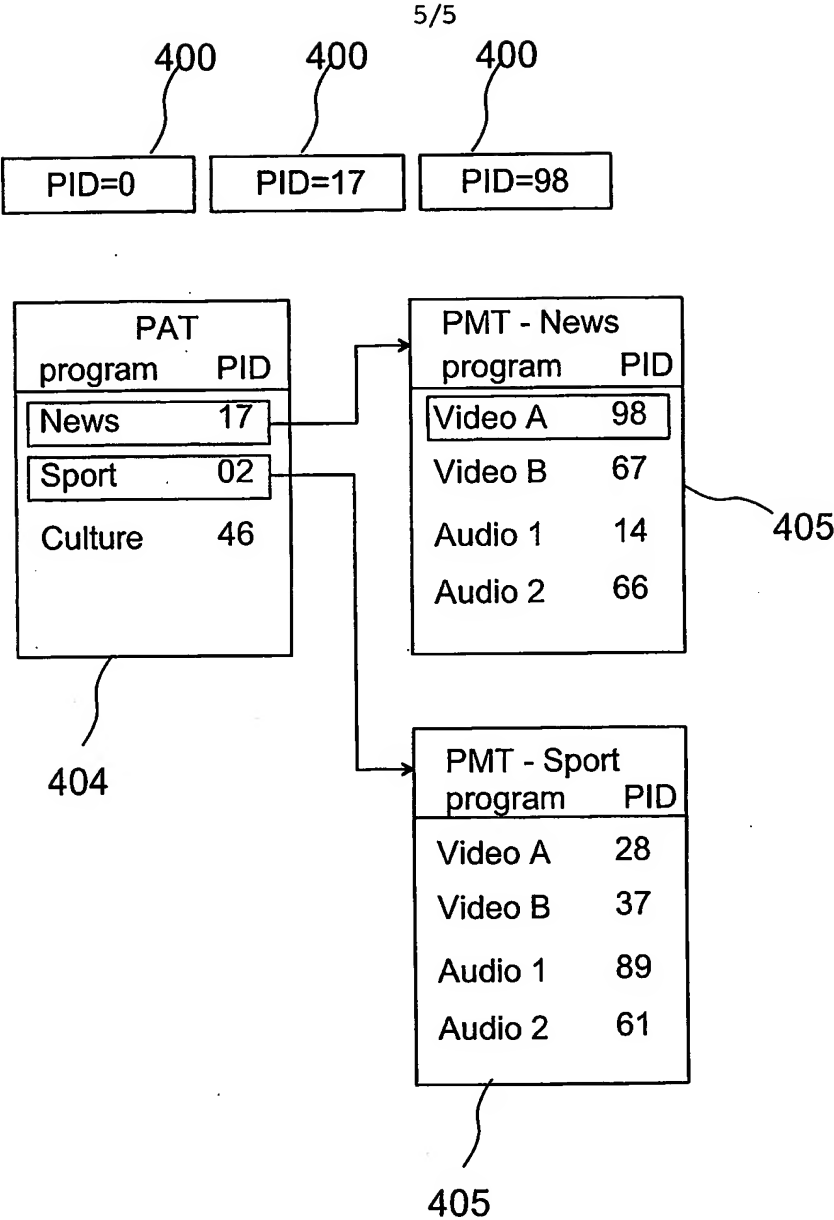


Fig. 4b

INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 03/00448

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H04H 9/00, G06K 9/00, H04N 17/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: H04N, G06K, H04H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ, INSPEC, TDB, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4230990 A (LERT, JR., J.G. ET AL), 28 October 1980 (28.10.80), column 7, line 60 - column 8, line 2, abstract --	1-19
X	WO 0070869 A1 (CONTENTWISE LTD), 23 November 2000 (23.11.00), page 1, line 6 - line 24; page 5, line 20 - line 22; page 7, line 27 - page 8, line 7, page 16, line 3 - page 22, line 29, abstract --	1,2,5-7, 9-12,14-18
X	US 5889548 A (CHAN, C.W.), 30 March 1999 (30.03.99), column 2, line 42 - column 3, line 49; column 4, line 55 - line 62; column 7, line 65 - column 8, line 11, abstract --	1,2,4-7, 9-12,14-18

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Date of the actual completion of the international search

27 August 2003

Date of mailing of the international search report

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International application No.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Information on patent family members

26/07/03

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